

Growth Potential of Red Hairy Caterpillar, *Amsacta moorei* Butler, in relation to certain Food Plants

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The larvæ of *A. moorei* were reared on eight natural food plants and the growth response of the insect recorded. On the basis of survival percentage of larvæ, percentage of adult emergence, pupal weight, size and fecundity of moths, *bajra* was the most preferred food for *A. moorei*, closely followed by *urd*. Castor was found to have a distinct retarding effect on the normal rate of growth of *A. moorei*, resulting in a prolonged larval period and also a relatively longer pupal period than in the case of the other food plants. The larvæ failed to survive when reared on paddy, sannhemp and *arhar*.

INTRODUCTION

The red hairy caterpillar, *Amsacta moorei* Butler, is polyphagous. Fletcher (1914) recorded it on *jowar*, *bajra*, groundnut, castor, cotton and pulses. It is also reported to attack cow pea, soyabean, maize, sannhemp and sorghum by Pruthi (1938) and Bindra & Kittur (1958). In view of the wide range of host plants of this pest, it is important to know how far the growth and development of the insect are influenced by the various food plants. This paper is a report on the relative food value of some of the important food plants of *A. moorei* which is an important and widely distributed pest of crops in Uttar Pradesh.

MATERIAL AND METHODS

A gravid female moth of *A. moorei* was collected from the field on 27th July, 1964. It was kept in a glass jar and fed on 5 per cent sugar solution soaked in cotton wool. The next day the moth laid eggs freely on the glass jar. Four days after egg-laying the eggs hatched satisfactorily. Immediately after hatching the tiny larvæ were carefully collected with the help of a camel hair brush and 20 larvæ were transferred to each of the eight sets of 10.0 cm. petridishes containing clean and tender leaves of the following food plants :

Maize (*Zea mays*), *jowar* (*Sorghum vulgare*), *bajra* (*Pennisetum typhoideum*), castor (*Ricinus communis*), *urd* (*Phaseolus mungo*), *arhar* (*Cajanus cajan*), paddy (*Oryza sativa*) and sannhemp (*Crotalaria juncea*).

The food was changed once in the morning every day. As the larvæ grew older, they were transferred to bigger petridishes (15.0 cm. diameter). The number of larvæ becoming pupæ, the time taken to complete the larval development and the larval weight at two intervals, viz., 6 and 12 days after hatching, were recorded.

After pupation, the pupæ were transferred to separate glass jars and their mouths covered with muslin cloth. Data on pupal period, pupal weight after 4 days of pupation, percentage of adult emergence, size and sex-ratio of the adults resulting from the larvæ reared on different food plants were also recorded.

The emerging moths were separated into another set of glass jars and fed on 5 per cent sugar solution. The data on the longevity and fecundity of the moths and the incubation period of the eggs were recorded for each set.

Twenty newly hatched larvæ of the same date of hatching were kept in 10.0 cm. petridishes in identical sets, as before, and the leaves of the same food plants were fed to them and the data recorded in the same manner as described earlier. In this way the growth and development of the insect on the different food plants were studied through two consecutive generations.

All tests were performed at room temperature prevailing at Kanpur during July to September (Max. 86-102° F, Min. 83-88° F and Relative humidity 50-92 per cent).

RESULTS AND DISCUSSION

The effect of different food plants on the percentage survival of the larvæ and the range of larval period is shown in Table 1. The growth index figures obtained by dividing the percentage(n) of the larvæ becoming pupæ by the average time (Av) taken to complete the development are also given in the table.

TABLE 1
THE SURVIVAL PERCENTAGE, RANGE OF LARVAL PERIOD AND GROWTH INDEX OF *A. moorei*
IN RELATION TO THE TYPE OF FOOD SUPPLIED

Food plant	Number of larvæ kept for observation	Number of larvæ pupated	Percentage of larvæ pupated (n)	Range of larval period in days	Average larval period in days (Av)	Growth index n Av
Maize ..	40	8	20.0	15-16	15.5	1.29
Jowar ..	40	10	25.0	15	15	1.66
Bajra ..	40	20	50.0	16	16	3.12
Castor ..	40	9	22.5	23-30	26.5	0.84
Urd ..	40	16	40.0	17-19	18	2.22

The Chi-square test for association of the type of food given and the number of larvæ pupated showed that the value of chi-square(x^2), which is 12.408, is significant at 5 per cent level. The results, therefore, suggest that the type of food has differential response to the survival percentage of *A. moorei* larvæ. *Bajra* is the most preferred and maize the least. On the basis of the growth index values also the development of larvæ was best on *bajra*, followed by *urd*, *jowar*, maize and castor in the descending order. It would be seen, however, that while the percentage of larvæ pupated was lowest on maize, castor resulted in the lowest growth index value apparently because the larval period was considerably prolonged on this food plant. The results also showed that the larvæ completely failed to survive when reared on paddy, sannhemp and *arhar*.

Table 2 shows the effect of different food plants in inducing variation in the larval weights. It will be seen from the table that the larval weights on the sixth day after hatching although slightly less in the case of *urd* and maize are practically identical in the case of *jowar*, *bajra* and castor. But differences are observable among them on the twelfth day after hatching. The results, therefore, suggest that the type of food has differential response to the gain in weight of larvæ from six days onwards. During this period the gain in weight in the case of *bajra* is highest and significantly different from all others except castor; while it is lowest with maize and *urd* which do not differ significantly from each other. However, no definite correlation can be established between the gain in weight of larvæ on different food plants and their growth index values.

TABLE 2
VARIATION IN LARVAL WEIGHT IN RELATION TO TYPE OF FOOD

Food plant	Mean larval weight in gm.		Gain in weight between the two intervals in gm.
	6 days after hatching	12 days after hatching	
Maize	0.0128	0.1360	0.1232
<i>Jowar</i>	0.0165	0.1685	0.1520
<i>Bajra</i>	0.0160	0.1915	0.1755
Castor	0.0160	0.1785	0.1625
<i>Urd</i>	0.0140	0.1505	0.1365

f = highly significant.

C. D. at 5% = 0.015

Table 3 shows the duration of the pupal period and the variations in the pupal weights when the larvæ were fed on different food plants. It would be seen from the table that the duration of the pupal life, though only slightly variable, was shortest with *bajra* and longest with castor, while *jowar*, maize and *urd* are found intermediate. The pupal period

was thus affected in much the same way as the larval period by the respective food plants. Further, the highest pupal weight is obtained with larvæ fed on *bajra* and next in order came *urd*, castor, *jowar* and maize. The pupal weight is thus apparently correlated with the growth index value of the plant except in the case of castor.

TABLE 3

DURATION OF PUPAL PERIOD AND PUPAL WEIGHTS OF *A. moorei* IN RELATION TO THE TYPE OF LARVAL FOOD SUPPLIED

Food plant	Range of pupal period (in days)	Average pupal period (in days)	Average pupal weight after 4 days of pupation in gm.
Maize	5-7	6.25	0.089
<i>Jowar</i>	6	6.00	0.097
<i>Bajra</i>	5-6	5.75	0.172
Castor	6-8	7.00	0.010
<i>Urd</i>	6-7	6.70	0.160

The effect of different foods in inducing variation in percentage emergence, size and sex-ratio of the adult moths is given in Table 4. This table shows that the percentage of adult emergence is highest when the larvæ are reared on *bajra* and lowest on *jowar*, while the remaining can be arranged in the following descending order : *Urd* > castor > maize. The percentage of adult emergence is thus affected by the respective food plants in much the same way as the survival percentage of larvæ. It is also seen from the results that the largest size is obtained if reared on *bajra* and *urd*, followed by those fed on castor, *jowar* and maize. These results show that the size of the moths as well as the pupal weight are affected by the different food plants in the same way and that the heaviest pupæ are the producers of large-sized moths. The females outnumber the males in the case of *jowar*, *bajra* and maize, but are equal in number if reared on castor and *urd*.

TABLE 4

PERCENTAGE EMERGENCE, SIZE AND SEX-RATIO OF ADULT MOTHS OF *A. moorei* IN RELATION TO THE TYPE OF LARVAL FOOD SUPPLIED

Food plant	Percentage of adult emergence	Mean size of male in cm.		Mean size of female in cm.		Sex-ratio male: female
		Body length	Wing expanse	Body length	Wing expanse	
Maize ..	62.5	1.4	2.25	1.43	2.66	1:1.50
<i>Jowar</i> ..	60.0	1.0	2.25	1.5	2.7	1:2.00
<i>Bajra</i> ..	80.0	1.5	2.5	1.6	2.85	1:1.66
Castor ..	66.6	1.2	2.5	1.3	2.7	1:1.00
<i>Urd</i> ..	75.0	1.5	2.5	1.5	2.85	1:1.00

Table 5 shows the longevity and fecundity of the moths bred from larvæ reared on different food plants, as also the incubation period of the eggs laid by them. It will be seen that the female moths, when fed on 5 per cent sugar solution, lived slightly longer than the males in all cases. They lived longest when bred from larvæ reared on *bajra* and shortest on castor. Marked differences are seen in regard to the number of eggs laid by the females, the largest numbers of eggs being laid by the moths raised on *bajra*, followed by *urd*, maize, castor, and *jowar* in the descending order. The incubation period of eggs varied only slightly, being longest in the case of moths raised on *urd* and shortest on castor.

TABLE 5
LONGEVITY, FECUNDITY AND INCUBATION PERIOD RECORDS OF *A. moorei* IN RELATION TO THE TYPE OF LARVAL FOOD SUPPLIED

Food plant	Average longevity in days		Average number of eggs laid per female	Average incubation period in days
	♂	♀		
Maize	3.0	5.0	349	3.0
<i>Jowar</i>	4.0	5.0	250	3.0
<i>Bajra</i>	4.0	6.0	512	3.0
Castor	4.0	4.5	324	2.8
<i>Urd</i>	3.0	5.0	448	3.5

Finally with regard to time for completing the life cycle, i.e., the period from egg-laying to the emergence of moths, it will be seen that it was 24.75 days with maize and *bajra*, 24.0 days with *jowar*, 28.25 days with *urd*, and 36.3 days with castor.

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